

**Chapter 18 The Electromagnetic Spectrum and Light****Section 18.1 Electromagnetic Waves****(pages 532–538)***This section describes the characteristics of electromagnetic waves.***Reading Strategy (page 532)**

**Comparing and Contrasting** As you read about electromagnetic waves, fill in the table below. If the characteristic listed in the table describes electromagnetic waves, write E in the column for Wave Type. Write M for mechanical waves and B for both. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

| <b>Electromagnetic and Mechanical Waves</b> |   |
|---|---|
| Travels through a vacuum                    | E |
| Travels through medium                      |   |
| Fits wave model                             | B |
| Fits particle model                         |   |
| Transverse wave                             |   |
| Longitudinal wave                           |   |

**What Are Electromagnetic Waves? (page 533)**

- What are electromagnetic waves? \_\_\_\_\_
- Electric fields are produced by electrically charged particles and by changing \_\_\_\_\_.
- Magnetic fields are produced by magnets, by changing \_\_\_\_\_, and by vibrating charges.
- Electromagnetic waves are produced when a(n) \_\_\_\_\_ vibrates or accelerates.
- Circle the letter of each sentence that is true about electric and magnetic fields.
  - An electromagnetic wave occurs when electric and magnetic fields vibrate at right angles to each other.
  - A magnetic field is surrounded by an electric current.
  - Changing electric and magnetic fields regenerate each other.
  - Electromagnetic waves are produced when an electric charge vibrates.
- Is the following sentence true or false? Electromagnetic waves need a medium to travel through. \_\_\_\_\_
- The transfer of energy by electromagnetic waves traveling through matter or across space is called \_\_\_\_\_.

**Chapter 18 The Electromagnetic Spectrum and Light****The Speed of Electromagnetic Waves (page 534)**

8. As a thunderstorm approaches, you see the lightning before you hear the thunder, because light travels \_\_\_\_\_ than sound.
9. Is the following sentence true or false? All electromagnetic waves travel at the same speed through a vacuum. \_\_\_\_\_
10. Circle the letter that gives the correct speed of light in a vacuum.
  - a.  $3.00 \times 10^8$  kilometers per second
  - b.  $3.00 \times 10^8$  meters per hour
  - c.  $3.00 \times 10^8$  meters per second
  - d.  $3.00 \times 10^8$  kilometers per hour

**Wavelength and Frequency (page 535)**

11. Circle the letter of each sentence that is true about electromagnetic waves.
  - a. Different electromagnetic waves can have different frequencies.
  - b. Wavelength is directly proportional to frequency.
  - c. Electromagnetic waves always travel at the speed of light.
  - d. All electromagnetic waves travel at the same speed in a vacuum.
12. As the wavelengths of electromagnetic waves increase, the frequencies \_\_\_\_\_, for waves moving in a(n) \_\_\_\_\_.

**Wave or Particle? (pages 536–537)**

13. Electromagnetic radiation behaves sometimes like a(n) \_\_\_\_\_ and sometimes like a stream of \_\_\_\_\_.
14. Interference only occurs when two or more waves overlap, so \_\_\_\_\_ experiment showed that light behaves like a \_\_\_\_\_.
15. The emission of electrons from a metal caused by light striking the metal is called the \_\_\_\_\_ effect.
16. Blue light has a higher frequency than red light, so photons of blue light have \_\_\_\_\_ energy than photons of red light.

**Intensity (page 538)**

17. The closer you get to a source of light, the \_\_\_\_\_ the light appears.
18. Intensity is the \_\_\_\_\_ at which a wave's energy flows through a given unit of area.
19. As photons travel farther from the source, the \_\_\_\_\_ of light decreases.